WHAT IS CLAIMED IS:

1. A mechanical pipe joint for sealing and restraining adjoining fluid piping members along an axis, said joint comprising:

a male piping member defining an outer surface;

a female piping member comprising a bell socket for receiving the male piping member, the bell socket defining an inner surface having a circumference larger than outer surface of the male piping member so as to define a sealing cavity therebetween;

a gland extending at least partially around the male piping member and being configured for axially-directed attachment to the bell socket, the gland defining at least one bearing surface that is forced axially as the gland is attached to the bell socket; and

a restraining gasket for sealing and restraining the male piping member relative to the female piping member, the restraining gasket being formed at least in part of an elastomeric material and comprising:

a sealing portion that fits substantially within the sealing cavity and provides a fluid seal between the inner surface of the bell socket and the outer surface of the male piping member; and

a restraining portion that surrounds the outer surface of the male piping member substantially outside of the sealing cavity and comprises a plurality of circumferentially-spaced arcuate locking members formed from a rigid material and arranged for restraining engagement between the bearing surface of the gland and the outer surface of the male piping member as the gland is axially attached to the bell socket, wherein the locking members are retained relative to each other by the elastomeric material before the attachment of the gland to the bell socket.

2. The mechanical pipe joint according to Claim 1, wherein the elastomeric material comprises the sealing portion and a plurality of spacers separate from and adhesively attached to the sealing portion, and wherein the circumferentially-spaced arcuate locking members are retained relative to each other by the plurality of spacers.

3. The mechanical pipe joint according to Claim 2, wherein the plurality of spacers are composed of an elastomeric material having a different stiffness than the stiffness of the sealing portion.

4. The mechanical pipe joint according to Claim 2, wherein each spacer is located circumferentially between two of the circumferentially-spaced arcuate locking members such that the plurality of circumferentially-spaced arcuate locking members are initially suspended out of contact with the outer surface of the male piping member at a distance of about 0.100 inches from the outer surface of the male piping member.

5. The mechanical pipe joint according to Claim 1, wherein the plurality of circumferentially-spaced arcuate locking members are configured to restrain the outer surface of the male piping member with a means for gripping the outer surface of the male piping member, the gripping means selected from the group consisting of:

a plurality of teeth;

an abrasive grit;

a hard granular material; or

a plurality of radial ridges.

6. The mechanical pipe joint according to Claim 1, further comprising an interface between the sealing portion and the restraining portion, the interface further defining a slope, the slope being configured to convert an axial force of the at least one bearing surface of the gland into a partially-axial force and a partially-radial force on the restraining gasket.

7. The mechanical pipe joint according to Claim 6, wherein the slope is directed radially outward towards the bell socket at an angle of approximately 10 to 20 degrees, with respect to a plane that is perpendicular to the axis, such that the partially-axial force is exerted first on the sealing portion, and the partially-radial force is exerted second on the plurality of circumferentially-spaced arcuate locking members so that the

axial force of the at least one bearing surface of the gland seals the sealing cavity about the male piping member before urging the plurality of circumferentially-spaced arcuate locking members into engagement with the outer surface of the male piping member so as to axially secure the male piping member within the bell socket.

8. The mechanical pipe joint according to Claim 7, wherein the slope is directed radially outward towards the bell socket at an angle of approximately 15 degrees, with respect to a plane that is perpendicular to the axis.

9. The mechanical pipe joint according to Claim 1, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is at least 15 degrees, with respect to the axis.

10. The mechanical pipe joint according to Claim 1, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is about 60 degrees, with respect to the axis.

11. The mechanical pipe joint according to Claim 1, wherein the bell socket is made of ductile iron, and wherein the male piping member is made of PVC.

12. The mechanical pipe joint according to Claim 11, wherein the rigid material is selected from the group consisting of:

mild steel;

ductile iron;

ceramic; or

plastic having a hardness greater than that of PVC.

13. The mechanical pipe joint according to Claim 1, wherein the bell socket and the male piping member are made of ductile iron.

14. The mechanical pipe joint according to Claim 1, further comprising a flange axially attached to the bell socket, the flange extending radially outward from the bell socket and wherein the flange further defines a first plurality of apertures extending through the flange parallel to the axis, and wherein the gland further defines a second plurality of apertures configured to correspond axially with the first plurality of apertures and to accept a plurality of threaded connectors configured to axially attach the gland to the bell socket.

15. A restraining gasket, for sealing and restraining a male piping member within an adjoining bell socket along an axis in a mechanical pipe joint, the restraining gasket being formed at least in part of an elastomeric material and comprising:

a sealing portion adapted to fit substantially within a sealing cavity defined between the male piping member and the bell socket;

a restraining portion adapted to surround the male piping member substantially outside the sealing cavity, the restraining portion comprising a plurality of circumferentially-spaced arcuate locking members formed from a rigid material and arranged for restraining engagement between a bearing surface of a gland and the male piping member, wherein the locking members are retained relative to each other by the elastomeric material before attachment of the gland to the bell socket; and

an interface between the sealing portion and the restraining portion, the interface being adapted to distribute an axial attachment force exerted by the bearing surface of the gland on the restraining portion to prevent a premature engagement of an outer surface of the male piping member by the plurality of circumferentially-spaced arcuate locking members.

16. The restraining gasket according to Claim 15, wherein the elastomeric material comprises the sealing portion and a plurality of spacers separate from and adhesively attached to the sealing portion, and wherein the plurality of circumferentially-spaced arcuate locking members are retained relative to each other by the plurality of spacers.

17. The restraining gasket according to Claim 16, wherein the plurality of spacers are composed of an elastomeric material having a different stiffness than the stiffness of the sealing portion.

18. The restraining gasket according to Claim 16, wherein each spacer is located circumferentially between two of the circumferentially-spaced arcuate locking members such that the plurality of circumferentially-spaced arcuate locking members are initially suspended out of contact with an outer surface of the male piping member at a distance of about 0.100 inches from the outer surface of the male piping member.

19. The restraining gasket according to Claim 15, wherein the plurality of circumferentially-spaced arcuate locking members are configured to restrain the outer surface of the male piping member with a means for gripping the outer surface of the male piping member, the gripping means selected from the group consisting of:

a plurality of teeth;

an abrasive grit;

a hard granular material; or

a plurality of radial ridges.

20. The restraining gasket according to Claim 15, wherein the interface further defines a slope, the slope being configured to convert the axial attachment force of the gland into a partially-axial force and a partially-radial force on the restraining gasket.

21. The restraining gasket according to Claim 20, wherein the slope is directed radially outward towards the bell socket at an angle of approximately 10 to 20 degrees, with respect to a plane that is perpendicular to the axis, such that the partially-axial force is exerted first on the sealing portion, and the partially-radial force is exerted second on the plurality of circumferentially-spaced arcuate locking members so that the axial attachment force of the gland seals the sealing cavity about the male piping member before urging the plurality of circumferentially-spaced arcuate locking members into

engagement with the outer surface of the male piping member so as to axially secure the male piping member within the bell socket.

22. The restraining gasket according to Claim 21, wherein the slope is directed radially outward towards the bell socket at an angle of approximately 15 degrees, with respect to a plane that is perpendicular to the axis.

23. The restraining gasket according to Claim 15, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is at least 15 degrees, with respect to the axis.

24. The restraining gasket according to Claim 15, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is about 60 degrees, with respect to the axis.

25. The restraining gasket according to Claim 15, wherein the rigid material is selected from the group consisting of:

hardened metal;

mild steel;

ductile iron;

ceramic; or

plastic having a hardness greater than that of PVC.

26. A method of sealing and axially securing a male piping member within an adjoining bell socket along an axis, the bell socket defining a sealing cavity between an inner surface of the bell socket and an outer surface of the male piping member, the method comprising;

providing a restraining gasket adapted to surround the male piping member, the restraining gasket being formed at least in part of an elastomeric material and having a sealing portion and a restraining portion, the restraining portion comprising a plurality of circumferentially-spaced arcuate locking members formed from a rigid material and

wherein the locking members are retained relative to each other by the elastomeric material;

surrounding the male piping member with the restraining gasket;

inserting the male piping member into the bell socket such that the sealing portion of the restraining gasket is positioned about the male piping member substantially within the sealing cavity so that a fluid seal is formed between the inner surface of the bell socket and the outer surface of the male piping member; and

attaching a gland, the gland extending at least partially around the male piping member and the gland defining at least one bearing surface, to the bell socket such that the at least one bearing surface produces an axial attachment force on the plurality of circumferentially-spaced arcuate locking members so that the locking members are urged into engagement with the male piping member so as to axially secure the male piping member within the bell socket.

27. A method according to Claim 26, wherein the providing step further comprises providing a plurality of elastomeric material components, the elastomeric material components comprising the sealing portion and a plurality of spacers, separate from and adhesively attached to the sealing portion, to retain the plurality of circumferentially-spaced arcuate locking members relative to each other.

28. A method according to Claim 27, wherein the providing step further comprises providing the plurality of spacers composed of an elastomeric material having a different stiffness than the stiffness of the sealing portion.

29. A method according to Claim 27, further comprising a suspending step, occurring before the attaching step, the suspending step comprising locating the spacers circumferentially between two of the circumferentially-spaced arcuate locking members such that the plurality of circumferentially-spaced arcuate locking members are initially suspended out of contact with the outer surface of the male piping member at a distance of about 0.100 inches from the outer surface of the male piping member.

30. A method according to Claim 26, wherein the providing step further comprises providing a surface located on the radially inner surface of each arcuate locking segment, the surface selected from the group consisting of:

a plurality of teeth;

an abrasive grit;

a hard granular material; or

a plurality of radial ridges

31. A method according to Claim 26 wherein providing step further comprises providing an interface between the sealing portion and the restraining portion, the interface further defining a slope, the slope being configured to convert the axial attachment force of the at least one bearing surface of the gland into a partially-axial force and a partially-radial force on the gasket.

32. A method according to Claim 31, wherein the providing step further comprises adjusting the slope to be directed radially outward towards the bell socket, such that the partially-axial force is exerted first on the sealing portion, and the partially radial force is exerted second on the plurality of circumferentially-spaced arcuate locking members so that the axial attachment force of the at least one bearing surface of the gland seals the sealing cavity about the male piping member before urging the plurality of circumferentially-spaced arcuate locking members into engagement with the outer surface of the male piping member so as to axially secure the male piping member within the bell socket.

32. A method according to Claim 26, wherein the providing step further comprises providing the plurality of circumferentially-spaced arcuate locking members wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is at least 15 degrees, with respect to the axis.

33. A method according to Claim 26, wherein the providing step further comprises providing the plurality of circumferentially-spaced arcuate locking members

wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is about 60 degrees, with respect to the axis.

34. A method according to Claim 26, wherein the providing step further comprises providing the rigid material wherein the rigid material is selected from the group consisting of:

hardened metal;

mild steel;

ductile iron;

ceramic; or

plastic having a hardness greater than that of PVC.

35. A method according to Claim 26, wherein the attaching step further comprises attaching the gland to the bell socket using a plurality of threaded connectors such that the at least one bearing surface of the gland is gradually brought into contact with the plurality of circumferentially-spaced arcuate locking members.

36. A restraining gasket for sealing and restraining a male piping member within an adjoining bell socket along an axis in a mechanical pipe joint, the restraining gasket being formed at least in part of an elastomeric material and comprising:

a sealing portion adapted to fit substantially within a sealing cavity defined between the male piping member and the bell socket;

a restraining portion adapted to surround the male piping member, the restraining portion comprising at least one arcuate locking member formed from a rigid material arranged for restraining engagement between a bearing surface of a gland and an outer surface of the male piping member; and

a raised portion disposed circumferentially on a radially-outward surface of the at least one arcuate locking member such that the raised portion provides a reduced surface area for reducing friction between the radially-outward surface of the at least one arcuate locking member and the bearing surface of the gland.

37. The restraining gasket according to Claim 36 wherein the at least one arcuate locking member comprises a plurality of circumferentially-spaced arcuate locking members.

38. The restraining gasket according to Claim 37, wherein the elastomeric material comprises the sealing portion and a plurality of spacers separate from and adhesively attached to the sealing portion, and wherein the plurality of circumferentially-spaced arcuate locking members are retained relative to each other by the plurality of spacers.

39. The restraining gasket according to Claim 38, wherein the plurality of spacers are composed of an elastomeric material having a different stiffness than the stiffness of the sealing portion.

40. The restraining gasket according to Claim 38, wherein each spacer is located circumferentially between two of the circumferentially-spaced arcuate locking members such that the plurality of circumferentially-spaced arcuate locking members are initially suspended out of contact with an outer surface of the male piping member at a distance of about 0.100 inches from the outer surface of the male piping member.

41. The restraining gasket according to Claim 36, wherein the at least one arcuate locking member is configured to restrain the outer surface of the male piping member with a means for gripping the outer surface of the male piping member, the gripping means selected from the group consisting of:

a plurality of teeth;

an abrasive grit;

a hard granular material; or

a plurality of radial ridges.

42. The restraining gasket according to Claim 37, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is at least 15 degrees, with respect to the axis.

43. The restraining gasket according to Claim 37, wherein an arc length of each of the plurality of circumferentially-spaced arcuate locking members is about 60 degrees, with respect to the axis.

44. The restraining gasket according to Claim 36, wherein the rigid material is selected from the group consisting of:

hardened metal;

mild steel;

ductile iron;

ceramic; or

plastic having a hardness greater than that of PVC.